CLAIMS

1. A method for forming an electronic device on a substrate, the device including a first electrically conductive region, a second electrically conductive region spaced from the first electrically conductive region and a region of a semiconductor material between the first and second electrically conductive regions and in contact with the first electrically conductive region, the method comprising doping an interfacial zone comprising at least part of the periphery of the semiconductor material at the interface between the semiconductor material and the first electrically conductive region by means of a dopant integral with the first electrically conductive region and capable of doping the semiconductor material so as to thereby enhance the conductivity of the interfacial zone.

2. A method as claimed in claim 1, comprising depositing the first electrically conductive region from a solution including the dopant.

3. A method as claimed in claim 2, wherein the dopant is capable of diffusing from the first electrically conductive region to the interfacial zone so as to dope the interfacial zone.

4. A method as claimed in any preceding claim, comprising the step of annealing the substrate after the deposition of the first electrically conductive region and the region of semiconductor material.

5. A method as claimed in any preceding claim, wherein the dopant is an oligomer of an organic molecule comprising an acid functional group.

6. A method as claimed in claim 5, wherein the oligomer is an oligomer of an organic molecule containing a sulphonic acid group.

7. A method as claimed in any of claims 1 to 4, wherein the dopant is a surface active dopant.

8. A method for forming an electronic device as claimed in claim 7, wherein the surface active dopant is a surfactant.

9. A method as claimed in any preceding claim, comprising:

depositing the first electrically conductive region;

roughening at least part of the surface of the first electrically conductive region; and

depositing the semiconductor material in contact with that part of the surface of the first electrically conductive region.

10. A method as claimed in claim 9, comprising the steps of:

depositing the first electrically conductive region on the substrate from a solution including a conducting material and a polymer; and

exposing the conductive material and the polymer to a solvent in which said polymer is soluble so as to dissolve at least some of the polymer and reveal the conductive material.

11. A method as claimed in any preceding claim, wherein the first electrically conductive region is deposited from a solution including molecules of an semiconductor material.

12. A method as claimed in any preceding claim, wherein the first electrically conductive region is deposited from a solution including molecules of a blockcopolymer having one or more electrically conductive blocks and one or more a semiconducting blocks.

13. A method as claimed in any preceding claim, comprising:

depositing a layer of the dopant on to at least part of the surface of the first electrically conductive region; and

depositing the semiconductor material in contact with that part of the surface of the first electrically conductive region.

14. A method as claimed in claim 13, wherein the layer of the dopant is deposited by polyelectrolyte self-assembly.

15. A method as claimed in any preceding claim, wherein at least one of the first and second electrically conductive regions comprises an electrically conductive polymer.

16. A method as claimed in any preceding claim, wherein the electrically conductive polymer is PEDOT/PSS.

17. A method as claimed in any preceding claim, wherein at least one of the first and second electrically conductive regions comprises a metal deposited from solution.

18. A method as claimed in claim 17, in which the metal is silver, gold, or copper.

19. A method as claimed in any preceding claim, wherein the semiconductor material is an organic semiconductor.

20. A method as claimed in claim 19, wherein the organic semiconductor is a conjugated polymer.

21. A method as claimed in any of claims 1 to 18 wherein the semiconductor material is an inorganic semiconductor.

22. A method as claimed in claim 21, wherein the inorganic semiconductor is silicon or cadmium selenide.

23. A method as claimed in claim 19 or 20, wherein the ionisation potential of the organic semiconductor is less than 5.8eV.

24. A method as claimed in any preceding claim, wherein the first and second electrically conductive regions constitute electrodes of the electronic device.

25. A method as claimed in any preceding claim, wherein the electronic device is a switching device.

26. A method as claimed in claim 25 as dependent on claim 24, wherein the switching device is a transistor and the electrodes are source and drain electrodes of the transistor.

27. A method as claimed in any preceding claim, wherein the semiconductor material remains undoped by the dopant internally of the interfacial zone.

28. A method as claimed in any preceding claim, wherein the thickness of the peripheral zone is between 1nm and 100 nm.

29. A method as claimed in any preceding claim, wherein the thickness of the peripheral zone is between 10 nm and 1μm.

30. A method as claimed in any of claims 1 to 27 or 29, wherein the thickness of the peripheral zone is between 100nm and 3 μm.

31. A method as claimed in any preceding claim, wherein the concentration of the dopant in the peripheral zone is higher than $10^{17}cm^{-3}$.

32. An electronic device formed on a substrate and comprising:

a first electrode constituted by a first electrically conductive region;

a second electrode constituted by a second electrically conductive region and spaced away from the first electrode;

a layer of a semiconductor material between the first and second electrodes and in contact with the first electrically conductive region, there being an interfacial zone comprising least part of the periphery of the semiconductor material at the interface between the semiconductor material and the first electrically conductive region in which the semiconductor material is doped by a dopant integral with the first electrically conductive region so as to have a higher electrical conductivity than the interior of the semiconductor material.

33. An electronic device as claimed in claim 32, wherein the semiconductor material is doped by a dopant that is an oligomer of an organic molecule comprising an acid functional group.

34. An electronic device as claimed in claim 33, wherein the oligomer is an oligomer of an organic molecule containing a sulphonic acid group.

35. An electronic device as claimed in any of claims 32 to 34, wherein the dopant is a surface active dopant.

36. An electronic device as claimed in claim 35, wherein the surface active dopant is a surfactant.

37. An electronic device as claimed in any of claims 32 to 36 wherein the first electrically conductive region has a roughened surface at its interface with the semiconductor material.

38. An electronic device as claimed in any of claims 32 to 37, wherein the first electrically conductive region comprises molecules of an organic semiconductor material.

39. An electronic device as claimed in any of claims 32 to 38, wherein the first electrically conductive region comprises molecules of a blockcopolymer having one or more electrically conductive blocks and one or more semiconducting blocks.

40. An electronic device as claimed in any of claims 32 to 39, comprising a layer of the dopant between the first electrically conductive region and the semiconductor material.

41. An electronic device as claimed in any of claims 32 to 40, wherein at least one of the first and second electrically conductive regions comprises an electrically conductive polymer.

42. An electronic device as claimed in claim 41, wherein the electrically conductive polymer is PEDOT/PSS.

43. An electronic device as claimed in any of claims 32 to 40, wherein at least one of the first and second electrically conductive regions comprises a metal deposited from solution.

44. An electronic device as claimed in claim 43, in which the metal is silver, gold, or copper.

45. A method as claimed in any of claims 32 to 44, wherein the semiconductor material is an organic semiconductor.

46. An electronic device as claimed in claim 45, wherein the semiconductor material is a conjugated polymer.

47. A method as claimed in any of claims 32 to 44 wherein the semiconductor material is an inorganic semiconductor.

48. A method as claimed in claim 47, wherein the inorganic semiconductor is silicon or cadmium selenide.

49. An electronic device as claimed in any of claims 32 to 46, wherein the ionisation potential of the conjugated polymer is less than 5.8eV.

50. An electronic device as claimed in any of claims 32 to 49, wherein the electronic device is a switching device.

51. An electronic device as claimed in any of claims 32 to 50, wherein the switching device is a transistor and the electrodes are source and drain electrodes of the transistor.

52. An electronic device as claimed in any of claims 32 to 51, wherein the semiconductor material remains undoped by the dopant internally of the interfacial zone.

53. An electronic device as claimed in any of claims 32 to 52, wherein the thickness of the peripheral zone is between 1nm and 100nm

54. An electronic device as claimed in any of claims 32 to 53, wherein the thickness of the peripheral zone is between 10 nm and 1μm.

55. An electronic device as claimed in any of claims 32 to 52 or 54, wherein the thickness of the peripheral zone is between 100nm and 3 μm.

56. An electronic device as claimed in any of claims 32 to 55, wherein the concentration of the dopant in the peripheral zone is higher than $10^{17}cm^{-3}$.